

Abbott Lectures, 2002

LECTURE 1

Thursday April 25, 7:00PM

*Organic Chemistry in
the Service of Society*

LECTURE 2

Friday April 26, 12:00 PM

*Foldamers: A New Approach to
Controlling Molecular Shape
and Function*

Samuel H. Gellman

Samuel H. Gellman was born on 12 September 1959 in Evanston, IL. He was raised in the suburbs of Chicago and Philadelphia. Gellman earned his A.B. from Harvard University in 1981 and his Ph.D. at Columbia University, under Ronald Breslow, in 1986. After an NIH post-doctoral fellowship at the California Institute of Technology, with Peter Dervan, Gellman joined the faculty at the University of Wisconsin-Madison as an Assistant Professor in 1987. He was promoted to Associate Professor in 1993 and to Professor in 1995. Gellman is currently an Evan P. Helfaer Professor of Chemistry and serves as Chair of the Organic Division in the Department of Chemistry. Among other awards, Gellman has been named an Arthur C. Cope Scholar by the American Chemical Society (1997). Gellman's service to the chemical community has included a term on the National Institutes of Health Medicinal Chemistry Study Section (1999-present).

Gellman's research interests are diverse, combining elements of organic chemistry, biological chemistry and biophysics. Gellman has played a leading role in an emerging new field, the study of oligomers with well-defined folding behavior, or

"foldamers." Foldamers are designed to emulate the structural and functional complexity displayed by proteins. The wide range of molecular operations carried out by proteins depend upon adoption of compact and specific folding patterns by polypeptide chains. Gellman's efforts to induce analogous folding behavior have focused mainly on α -amino acid oligomers (" α -peptides"). Gellman and co-workers have shown that all three types of secondary structure observed in folded proteins, helix, sheet and turn, are displayed by α -peptides in organic solvents, when residues are properly selected. Some α -peptide secondary structures are very stable in aqueous solution. Amphiphilic α -peptides that adopt amphiphilic helical conformations in aqueous solution display potent antimicrobial activity; these α -peptides mimic natural host-defense peptides like magamms.

In a more traditional line of biophysical research, Gellman has explored the factors that control β -sheet formation in proteins. This area was neglected for many years because it was difficult to identify peptides that would adopt β -sheet conformations without aggregating. Gellman's group has contributed to a set of design rules that allow creation of peptides that adopt β -sheet conformations with predictable dimensions. These tools have been used to address long-standing and fundamental questions regarding β -sheet stability.

Gellman's research interests include the use of small molecules to manipulate protein behavior. Gellman and co-workers have developed a method for protein refolding in which sequential introduction of small molecules during dilution of a chemically denatured protein enhances recovery of the native form. The invention of Gellman's "artificial chaperone" technique was inspired by the refolding-mechanism of natural chaperone proteins. In a separate effort, the Gellman group has created a "tripod amphiphiles," which are intended to promote the solubilization and crystallization of intrinsic membrane proteins.

George A. Abbott 1874-1973

Dr. George Alonzo Abbott, Professor Emeritus at the University of North Dakota, had a long and fruitful service to the State of North Dakota and to the science of chemistry. He was born July 7, 1874, in Alma, Illinois. Dr. Abbott received both the B. S. and M. A. *pro merito* from DePauw University. From 1896 until 1904 he taught chemistry in high schools in Indiana and Minnesota. In 1903, he received the Austen Research Fellowship at the Massachusetts Institute of Technology. Under the guidance of A. A. Noyes, he received a Ph. D. in 1908. In this first class of doctorates in chemistry were such notables as Edward Washburn, Charles Kraus, and Richard Tolman. Dr. Abbott joined the chemistry staff of the North Dakota Agricultural College (North Dakota State University) in 1909. In 1910 he was appointed Professor and Chairman of the Department of Chemistry at the University of North Dakota. His devotion to teaching and the application of chemistry for the betterment of North Dakota summarize his outstanding contributions. His interests in water quality and in natural products such as lignite, for which North Dakota is recognized, gave him national recognition. For half a century he was the only toxicologist in a wide area of the upper Midwest. He found time to do a weekly radio program "Science from the Sidelines" which was broadcast for over twenty years. Professor Abbott was a founder and charter member of the North Dakota Academy of Science. He was a member of the Red River Valley Section of the American Chemical Society, A Fellow of the American Institute of Chemists, member of Sigma Xi, and a charter member of the University of North Dakota Phi Beta Kappa chapter. Dr. Abbott retired from administration in 1948 and from teaching in 1952. He continued toxicological work until 1970.

The George A. Abbott Lecture was established by gifts from the University of North Dakota Alumni.